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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

FULLER, ERIC B

ART UNIT	PAPER NUMBER
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1762

DATE MAILED: 06/30/2003

23

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/905,320

Applicant(s)

BASCERI ET AL.

Examiner

Eric B Fuller

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 June 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8, 17-22 and 52-66 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8, 17-22 and 52-66 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-6, 17-20, 52-57, 60-63, and 66 rejected under 35 U.S.C. 103(a) as being unpatentable over Dornfest et al. (US 2002/0197793 A1) in view of Xiang et al. (US 6,146,907).

Dornfest, from paragraph [0056] to [0075], teaches a process of applying a BST film by CVD. A substrate is provided in the chamber [0057]. The barium and strontium precursors are provided as one source, and titanium precursor is supplied as another [0059-0060]. As it is only taught that the ratios of the precursors *may* vary during deposition [0061], the reference reads on supplying the precursors at a constant atomic ratio and volumetric flow. It is taught that varying the flow rate of the one or more oxidizers controls the chemical and physical properties of the film [0065]. The oxidizer may be O₂, N₂O, or O₃ [0065]. The reference fails to teach varying the flow rate of the oxidizers *during the deposition*.

However, Xiang teaches that when mixed metal oxide films comprising barium strontium and titanium are used for DRAM devices, it is desirable to have a low dielectric loss or leakage and a high dielectric constant in the film (column 3, lines 33-

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50). It is taught that these benefits are achieved by having the chemical and physical properties of the mixed metal oxide film vary throughout the thickness of the film.

Although the film of Xiang is deposited by means other than CVD, it would be realized from this reference by one of ordinary skill in the art that a dielectric film would have the benefits of lower leakage and higher dielectric constant by varying the chemical and physical properties of the film throughout the thickness, regardless of the deposition method. As Dornfest teaches that varying the oxygen flow controls the chemical and physical properties of the film and Xiang teaches that it is desirable to have the chemical and physical properties of the film vary throughout the thickness of the film, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to vary the oxygen flow during the deposition process taught by Dornfest. By doing so, one would reap the benefits of lower leakage and a higher dielectric constant of the deposited film. The change in atomic concentration of barium, strontium, and titanium in the film is inherent to changing the oxygen flow, as adding more oxygen to the film reduces the concentration of all three metals.

As to claims 2, 19, 53, and 62, it would have been within the skill of one practicing in the art to determine how many times to change the flow rate of oxidizer in order to achieve the desired chemical and physical properties of the film, through routine experimentation.

Claims 7, 8, 21, 22, 58, 59, 64, and 65 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dornfest et al. (US 2002/0197793 A1) in view of Xiang et al.

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(US 6,146,907), as applied to claims 1, 17, 52, and 60 above, and further in view of Kang et al. (US 6,127,218).

Dornfest in view of Xiang teach the limitations shown above, but fail to teach that the oxidizer may be NO. However, Kang teaches that NO is an equivalent substitute for N₂O as an oxidizer for BST films in CVD processes. Therefore, to use NO as an oxidizer in Dornfest would have been obvious at the time the invention was made to a person having ordinary skill in the art with a reasonable expectation of success, as equivalence has been shown.

Response to Arguments

Applicant argues that Dornfest fails to teach varying the oxygen flow during the deposition. The examiner has considered this argument and has found it convincing. In response, the examiner has supplied Xiang, which provides motivation for varying the oxygen flow during the deposition, as it would cause the deposited film to have varying properties throughout the thickness of the film, resulting in a higher dielectric constant and lower leakage.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eric B Fuller whose telephone number is (703) 308-6544. The examiner can normally be reached on Mondays through Thursdays.


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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive Beck, can be reached at (703) 308-2333. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.



EBF
June 30, 2003



TIMOTHY MEEKS
PRIMARY EXAMINER